Internal air flow

The needs of the engine also complicate the issue and present requirements that inevitably increase drag. Any bike needs a supply of cool fresh air to breathe efficiently, and to provide engine cooling. Many attempts have been made to use the high pressure at the front of the machine to slightly pressurize the air fed to the induction system, to achieve a supercharging or ram effect at high speeds. In the past, carburetion problems made this difficult to exploit properly, but with modern electronic fuel injection systems it has become a more practical proposition. An alternative technique is to totally enclose the carburettors inside a large air box fed with cool air from ram tubes in the front of the fairing. At normal road going speeds the potential power benefit of ram charging is quite minor; very high speeds are necessary for it to become significant. At 160 km/h. the maximum possible benefit is a bit over 1% and we have to be travelling at around 320 km/h. to get a 5% increase in power. This might add about 5 km/h. to the top speed at 320 km/h. but only about 0.5 km/h. at 160 km/h. However, these values are assuming that we can make use of the maximum potential, in practice various intake losses prevent us from achieving those figures. Generally the main benefit of ducting air from the front is to ensure a supply of cool air to the intake system.

Figure 5.5 shows actual airbox pressure measurements taken from a GP 250 machine. We can see how the airbox pressure rises in like fashion to the speed increase. The spikes in the pressure curve occur when the throttle is shut for a short time whilst changing gear. The engine is not sucking any air out of the box at that time and the airbox pressure rises towards the full ram pressure available.
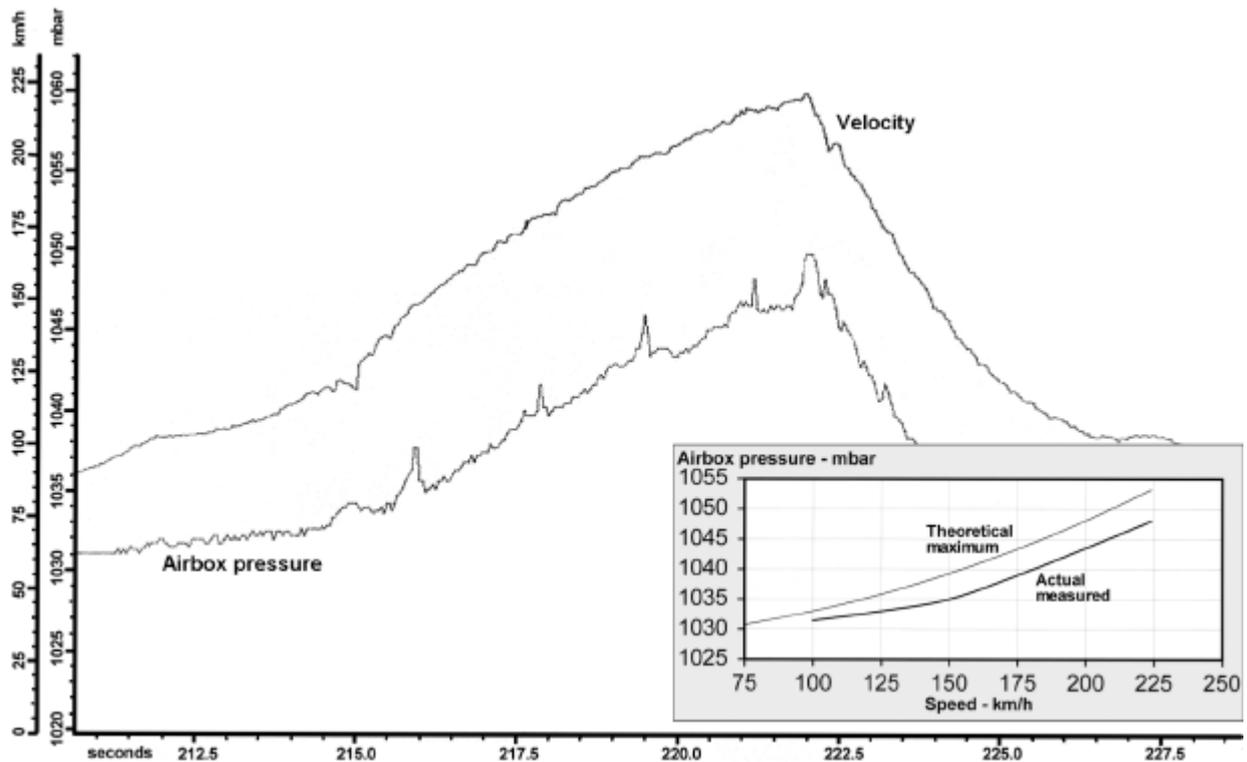

Fig. 5.5 **Traces from the data acquisition system of a 250 GP racer. The horizontal axis shows elapsed time in seconds, the upper curve shows velocity in km/h and the lower curve shows the airbox pressure in milli-bars. The inset shows the same data re-plotted against speed. Note how the real data is less than the theoretical maximum.**

(From data supplied by 2D)